NAME

plan9.ini – configuration file primarily for PCs

SYNOPSIS

none

DESCRIPTION

When booting Plan 9 on a PC, the bootstrap programs described in 9boot(8) first read, via TFTP or a FAT filesystem on the boot disk, a file containing configuration information. This file, /cfg/pxe/hex–digits (TFTP; see 9boot(8)) or plan9.ini (FAT), looks like a shell script containing lines of the form

name=value

each of which defines a kernel or device parameter.

Blank lines and Carriage Returns (\r) are ignored. # comments are ignored, but are only recognised if # appears at the start of a line.

For devices, the generic format of value is

type=TYPE [port=N] [irq=N] [mem=N] [size=N] [dma=N] [ea=N]

specifying the controller type, the base I/O port of the interface, its interrupt level, the physical starting address of any mapped memory, the length in bytes of that memory, the DMA channel, and for Ethernets an override of the physical network address. Not all elements are relevant to all devices; the relevant values and their defaults are defined below in the description of each device.

The file is used by the bootstrap programs and the kernel to configure the hardware available, although nowadays the kernel can usually detect the attached hardware by itself. The information it contains is also passed to the boot process, and subsequently other programs, as environment variables (see boot(8)). However, values whose names begin with an asterisk * are used by the kernel and are stored in #ec rather than #e.

The following sections describe how variables are used.

ETHERNET

etherX=value

This defines an Ethernet interface. X, a unique monotonically increasing number beginning at 0, identifies an Ethernet card to be probed at system boot. Probing stops when a card is found or there is no line for etherX+1. After probing as directed by the etherX lines, any remaining Ethernet cards that can be automatically detected are added. Almost all cards can be automatically detected. For debugging purposes, automatic probing can be disabled by specifying the line *noetherprobe=.

Many cards are software configurable and do not require all options. Unspecified options default to the factory defaults.

Known TYPEs are

igbe The Intel 8254X Gigabit Ethernet controllers, as found on the Intel PRO/1000 adapters for copper (not fiber). Completely configurable.

igbepcie

The Intel 8256[36], 8257[12], and 82573[ev] Gigabit Ethernet PCI–Express controllers. Completely configurable.

rtl8169The Realtek 8169 Gigabit Ethernet controller. Completely configurable.

ga620 Netgear GA620 and GA620T Gigabit Ethernet cards, and other cards using the Alteon Acenic chip such as the Alteon Acenic fiber and copper cards, the DEC

DEGPA–SA and the SGI Acenic. Completely configurable.

dp83820National Semiconductor DP83820–based Gigabit Ethernet adapters, notably the D–Link DGE–500T. Completely configurable.

vgbe The VIA Velocity Gigabit Ethernet controller. Known to drive the VIA8237 (ABIT AV8), but at 100Mb/s full–duplex only.

m10g The Myricom 10–Gigabit Ethernet 10G–PCIE–8A controller. Completely configurable.

i82598 The Intel 8259[89] 10–Gigabit Ethernet PCI–Express controllers. Completely configurable.

i82557 Cards using the Intel 8255[789] Fast Ethernet PCI Bus LAN Controller such as the Intel EtherExpress PRO/100B. Completely configurable, no options need be given. If you need to force the media, specify one of the options (no value) 10BASE–T, 10BASE–2, 10BASE–5, 100BASE–TX, 10BASE–TFD,

100BASE–TXFD, 100BASE–T4, 100BASE–FX, or 100BASE–FXFD. Completely configurable.

2114x Cards using the Digital Equipment (now Intel) 2114x PCI Fast Ethernet Adapter Controller, for example the Netgear FA310. Completely configurable, no options need be given. Media can be specified the same was as for the i82557. Some cards using the PNIC and PNIC2 near–clone chips may also work. 83815 National Semiconductor DP83815–based adapters, notably the Netgear FA311, Netgear FA312, and various SiS built–in controllers such as the SiS900. On the SiS controllers, the Ethernet address is not detected properly; specify it with an ea= attribute. Completely configurable. rtl8139The Realtek 8139 Fast Ethernet controller. Completely configurable.

vt6102 The VIA VT6102 Fast Ethernet Controller (Rhine II).

vt6105mThe VIA VT6105M Fast Ethernet Controller (Rhine III).

smc91cxx

SMC 91cXX chip–based PCMCIA adapters, notably the SMC EtherEZ card.

elnk3 The 3COM Etherlink III series of cards including the 5x9, 59x, and 905 and 905B. Completely configurable, no options need be given. The media may be specified by setting media= to the value 10BaseT, 10Base2, 100BaseTX, 100BaseFX, aui, and mii. If you need to force full duplex, because

for example the Ethernet switch does not negotiate correctly, just name the word (no value) fullduplex or 100BASE–TXFD. Similarly, to force 100Mbit operation, specify force100. Port 0x110 is used for the little ISA configuration dance.

3c589 The 3COM 3C589 series PCMCIA cards, including the 3C562 and the 589E. There is no support for the modem on the 3C562. Completely configurable, no options need be given. Defaults are

port=0x240 irq=10

The media may be specified as media=10BaseT or media=10Base2.

ec2t The Linksys Combo PCMCIA EthernetCard (EC2T), EtherFast 10/100 PCMCIA cards (PCMPC100) and integrated controllers (PCM100), the Netgear FA410TX 10/100 PCMCIA card and the Accton EtherPair–PCMCIA (EN2216). Completely configurable, no options need be given. Defaults are

port=0x300 irq=9

These cards are NE2000 clones. Other NE2000 compatible PCMCIA cards may be tried with the option

id=string

where string is a unique identifier string contained in the attribute memory of the card (see pcmcia(8)); unlike most options in plan9.ini, this string is case–sensitive. The option dummyrr=[01] can be used to turn off (0) or on (1) a dummy remote read in the driver in such cases, depending on how NE2000 compatible they are.

ne2000 Not software configurable iff ISA; PCI clones or supersets are software configurable; includes the Realtek 8029 clone used by Parallels. 16–bit card. Defaults are

port=0x300 irq=2 mem=0x04000 size=0x4000

The option (no value) nodummyrr is needed on some (near) clones to turn off a dummy remote read in the driver.

amd79c970

The AMD PCnet PCI Ethernet Adapter (AM79C970). (This is the Ethernet adapter used by VMware.) Completely configurable, no options need be given.

wd8003 Includes WD8013 and SMC Elite and Elite Ultra cards. There are varying degrees of software configurability. Cards may be in either 8–bit or 16–bit slots. Defaults are

port=0x280 irq=3 mem=0xD0000 size=0x2000

BUG: On many machines only the 16 bit card works.

sink A /dev/null for Ethernet packets -- the interface discards sent packets and never receives any. This is used to provide a test bed for some experimental Ethernet bridging software.

wavelanLucent Wavelan (Orinoco) IEEE 802.11b and compatible PCMCIA cards. Compatible cards include the Dell TrueMobile 1150 and the Linksys Instant Wireless Network PC Card. Port and IRQ defaults are 0x180 and 3 respectively.

These cards take a number of unique options to aid in identifying the card correctly on the 802.11b network. The network may be ad hoc or managed (i.e. use an access point):

mode=[adhoc, managed]

and defaults to managed. The 802.11b network to attach to (managed mode) or identify as (ad hoc mode), is specified by

essid=string

and defaults to a null string. The card station name is given by

station=string

and defaults to Plan 9 STA. The channel to use is given by

channel=number

where number lies in the range 1 to 16 inclusive; the channel is normally negotiated automatically.

If the card is capable of encryption, the following options may be used:

crypt=[off, on]

and defaults to on.

keyN=string

sets the encryption key N (where N is in the range 1 to 4 inclusive) to string; this will also set the transmit key to N (see below). There are two formats for string which depend on the length of the string. If it is exactly 5 or 13 characters long it is assumed to be an alphanumeric key; if it is exactly 10 or 26 characters long the key is assumed to be in hex format (without a leading 0x). The lengths are checked, as is the format of a hex key.

txkey=number

sets the transmit key to use to be number in the range 1 to 4 inclusive. If it is desired to exclude or include unencrypted packets

clear=[off, on]

configures reception and defaults to inclusion.

The defaults are intended to match the common case of a managed network with encryption and a typical entry would only require, for example

essid=left–armpit key1=afish key2=calledraawaru

if the port and IRQ defaults are used. These options may be set after boot by writing to the device's ctl file using a space as the separator between option and value, e.g.

echo 'key2 1d8f65c9a52d83c8e4b43f94af' >/net/ether0/0/ctl

Card–specific power management may be enabled/disabled by

pm=[on, off]

wavelanpci

PCI Ethernet adapters that use the same Wavelan programming interface. Currently the only tested cards are those based on the Intersil Prism 2.5 chipset.

DISKS, TAPES

(S)ATA controllers are autodetected.

usbX=type=uhci

usbX=type=ohci

usbX=type=ehci

This specifies the settings for a USB UHCI, OHCI or EHCI controller. Like the Ethernet controllers, USB controllers are autodetected after scanning for the ones listed in plan9.ini. Thus, most systems will not need a usbX line. Also like the Ethernet controllers, USB autoprobing can be disabled by specifying the line *nousbprobe=.

scsiX=value

This defines a SCSI interface which cannot be automatically detected by the kernel.

Known TYPEs are

aha1542

Adaptec 154x series of controllers (and clones). Almost completely configurable, only the

port=0x300

option need be given.

NCR/Symbios/LSI–Logic 53c8xx–based adapters and Mylex MultiMaster (Buslogic BT–*) adapters are automatically detected and need no entries.

By default, the NCR 53c8xx driver searches for up to 32 controllers. This can be changed by setting the variable *maxsd53c8xx.

By default the Mylex driver resets SCSI cards by using both the hard reset and SCSI bus reset flags in the driver interface. If a variable *noscsireset is defined, the SCSI bus reset flag is omitted.

aoeif=list

This specifies a space–separated list of Ethernet interfaces to be bound at boot to the ATA–over–Ethernet driver, aoe(3). For example, aoeif=ether0 ether1. Only interfaces on this list will initially be accessible via AoE.

aoedev=e!#æ/aoe/shelf.slot

This specifies an ATA–over–Ethernet device accessible via the interfaces named in aoeif on AoE shelf and slot to use as a root device for bootstrapping.

AUDIO

audioX=value

This defines a pre–USB sound interface.

Known types are

sb16 Sound Blaster 16.

ess1688 A Sound Blaster clone.

The DMA channel may be any of 5, 6, or 7. The defaults are

port=0x220 irq=7 dma=5

Uarts

Plan 9 automatically configures COM1 and COM2, if found, as eia0 (port 0x3F8, IRQ4) and eia1 (port 0x2F8, IRQ3) respectively. These devices can be disabled by adding a line:

eiaX=disabled

This is typically done in order to reuse the IRQ for another device.

Plan 9 used to support various serial concentrators, including the TTC 8 serial line card and various models in the Star Gate Avanstar series of intelligent serial boards. These are no longer supported; the much simpler Perle PCI–Fast4, PCI–Fast8, and PCI–Fast16 controllers have taken their places. These latter cards are automatically detected and need no configuration lines.

The line serial=type=com can be used to specify settings for a PCMCIA modem.

mouseport=value

This specifies where the mouse is attached. Value can be

ps2 the PS2 mouse/keyboard port. The BIOS setup procedure should be used to configure the machine appropriately.

ps2intellimouse

an Intellimouse on the PS2 port.

0 for COM1

1 for COM2

modemport=value

Picks the UART line to call out on. This is used when connecting to a file server over an async line. Value is the number of the port.

console=value params

This is used to specify the console device. The default value is cga; a number 0 or 1 specifies COM1 or COM2 respectively. A serial console is initially configured with the uart(3) configuration string b9600 l8 pn s1, specifying 9600 baud, 8 bit bytes, no parity, and one stop bit. If params is given, it will be used to further configure the uart. Notice that there is no = sign in the params syntax. For example,

console=0 b19200 po

would use COM1 at 19,200 baud with odd parity.

PC CARD

pccard0=disabled

Disable probing for and automatic configuration of PC card controllers.

pcmciaX=type=XXX irq=irq

If the default IRQ for the PCMCIA is correct, this entry can be omitted. The value of type is ignored.

pcmcia0=disabled

Disable probing for and automatic configuration of PCMCIA controllers.

NVRAM

nvram=file

nvrlen=

length

nvroff=

offset

This is used to specify an nvram device and optionally the length of the ram and read/write offset to use. These values are consulted by readnvram (see authsrv(2)). The most common use of the nvram is to hold a secstore(1) password for use by factotum(4).

nvr=value

This is used by the WORM file server kernel to locate a file holding information to configure the file system. The file cannot live on a SCSI disk. The default is fd!0!plan9.nvr (sic), unless bootfile is set, in which case it is plan9.nvr on the same disk as bootfile. The syntax is either fd!unit!name or hd!unit!name where unit is the numeric unit id. This variant syntax is a vestige of the file server kernel's origins.

BOOTING

bootfile=value

This is used to direct the actions of the bootstrap programs by naming the device and file from which to load the kernel.

rootdir=dir

rootspec=spec

These are used by the bootstrap programs to identify the directory dir to make the root directory for the kernel, and the file system specifier spec (see mount in bind(2)) on which it can be found. These are usually used to test variant file systems for distributions, etc.

bootargs=args

The value of this variable is passed to boot(8) by the kernel as the name of the root file system. It is typically used to specify additional arguments to pass to kfs(4) or ipconfig(8). For example, if the system is to run from a local kfs(4) partition, the definition might read bootargs=local!#S/sdC0/fs. See boot(8) for more.

nobootprompt=root

Suppress the root from prompt and use root as the answer instead.

user=user

Suppress the user prompt and use user as the answer instead.

debugfactotum=

Causes boot(8) to start factotum with the –p option, so that it can be debugged.

factotumopts=options

Causes boot(8) to start factotum with the given options, which must be a single word (i.e., contain no whitespace).

venti=value

When booting from a local fossil server backed by a local or remote venti server, this variable specifies how to establish the connection to the venti server. See boot(8) for more.

cfs=partition

This names the file holding the disk partition for the cache file system, cfs(4). Extending the bootargs example, one would write cfs=#S/sdC0/cache.

bootdisk=value

This deprecated variable was used to specify the disk used by the cache file system and other disk–resident services. It is superseded by bootargs and cfs.

partition=value

This defines the partition table 9load(8) will examine to find disk partitioning information. By default, a partition table in a Plan 9 partition is consulted; if no such table is found, an old–Plan 9 partition table on the next–to–last or last sector of the disk is consulted. A value of new consults only the first table, old only the second.

readparts=

Causes boot(8) to look for MBR and Plan 9 partition tables on all sd(3) disks, even before factotum is started, so NVRAM, for example, may be found. On PCs, 9load (but not 9boot) normally does this and passes the partitions found in #ec/sdCnpart.

fs=a.b.c.d

auth=a.b.c.d

These specify the IP address of the file and authentication server to use when mounting a network–provided root file system. They are used only if the addresses cannot be determined via DHCP.

PROCESSOR

*norealmode=

The PC kernel switches the processor to 16–bit real mode to run BIOS interrupts, for example to find the memory map or to enable VESA. This variable disables such switches.

*noe820scan=

When available, the PC kernel uses the BIOS E820 memory map to size memory. This variable disables the scan.

*maxmem=address

This defines the maximum physical address that the system will scan when sizing memory. By default the PC operating system will scan up to 3.75 gigabytes (0xF0000000, the base of kernel virtual address space), but setting *maxmem will limit the scan. *maxmem must be less than 3.75 gigabytes. This variable is not consulted if using the E820 memory map.

*kernelpercent=percent

This defines the percentage of available memory reserved for the kernel allocation pool. The remainder is left for user processes. The default percent is 30 on CPU servers, 60 on terminals with less than 16MB of memory, and 40 on terminals with memories of 16MB or more. Terminals use more kernel memory because draw(3) maintains its graphic images in kernel memory. This deprecated option is rarely necessary in newer kernels.

*nomce=value

If machine check exceptions are supported by the processor, then they are enabled by default. Setting this variable to 1 causes them to be disabled even when available.

*nomp=

A multiprocessor machine will enable all processors by default. Setting *nomp restricts the kernel to starting only one processor and using the traditional interrupt controller.

*ncpu=cpus

Setting *ncpu restricts the kernel to starting at most cpus processors.

*pcimaxbno=bno

Limits the maximum bus number probed on a PCI bus (default 7). For example, a bno of 1 should suffice on a 'standard' motherboard with an AGP slot. This, and *pcimaxdno below are rarely used and only on troublesome or suspect hardware.

*pcimaxdno=dno

Limits the maximum device number probed on a PCI bus (default 31).

*nopcirouting=

Disable pci routing during boot. May solve interrupt routing problems on certain machines.

*nodumpstack=

Disable printing a stack dump on panic. Useful if there is only a limited cga screen available, otherwise the textual information about the panic may scroll off.

ioexclude=range

Specifies a list of ranges of I/O ports to exclude from use by drivers. Ranges are inclusive on both ends and separated by commas. For example:

    ioexclude=0x330–0x337,0x430–0x43F

umbexclude=

range

Specifies a list of ranges of UMB to exclude from use by drivers. Ranges are inclusive on both ends and separated by commas. For example:

    umbexclude=0xD1800–0xD3FFF

apm0=

This enables the ``advanced power management'' interface as described in apm(3) and apm(8). The main feature of the interface is the ability to watch battery life (see stats(8)). It is not on by default because it causes problems on some laptops.

VIDEO

monitor=monitor

vgasize=xxyxd

These are used not by the kernel but by termrc (see cpurc(8)) when starting vga(8).

*dpms=value

This is used to specify the screen blanking behavior of the MGA4xx video driver. Values are standby, suspend, and off. The first two specify differing levels of power saving; the third turns the monitor off completely.

Multiple Configurations

A plan9.ini file may contain multiple configurations, each within a block beginning with a line

    [tag]

A special block with the tag menu gives a list of blocks from which the user may interactively select the contents of plan9.ini. There may also be multiple blocks with the tag common which will be included in all selections; if any lines appear in plan9.ini before the first block, they are treated as a common block.

Within the menu block the following configuration lines are allowed:

menuitem=tag[, description]

The block identified by tag will appear in the presented menu. The menu entry will consist of the tag unless the optional description is given.

menudefault=tag[, timeout]

Identifies a default block to be given in the menu selection prompt. If the optional timeout is given (in seconds), the default block will be selected if there is no user input within the timeout period.

menuconsole=value[, baud]

Selects a serial console upon which to present the menu as no console or baud configuration information will have been processed yet (the plan9.ini contents are still to be decided...).

In response to the menu being printed, the user is prompted to select a menu item from the list. If the numeric response is followed by a p, the selected configuration is printed and the menu presented again.

The line

menuitem=tag

is prefixed to the selected configuration as an aid to user–level initialization scripts.

EXAMPLES

A representative plan9.ini:

% cat /n/c:/plan9.ini

ether0=type=3C509

mouseport=ps2

modemport=1

serial0=type=generic port=0x3E8 irq=5

monitor=445x

vgasize=1600x1200x8

%

Minimum CONFIG.SYS and AUTOEXEC.BAT files to use COM2 as a console:

% cat /n/c:/config.sys

SHELL=COMMAND.COM COM2 /P

% cat /n/c:/autoexec.bat

@ECHO OFF

PROMPT pg

```
PATH C:\DOS;C:\BIN
mode com2:96,n,8,1,p
SET TEMP=C:\TMP
%
```

Simple plan9.ini with multiple configurations:

```
        [menu]
menuitem=vga, Plan 9 with VGA
menuitem=novga, Plan 9 no automatic VGA
menudefault=vga
[vga]
monitor=multisync135
vgasize=1024x768x8
[novga]
[common]
ether0=type=i82557
audio0=type=sb16 port=0x220 irq=5 dma=1
```

With this, the following menu will be presented on boot:

```
        Plan 9 Startup Menu:
====================
        1. Plan 9 with VGA
2. Plan 9 no automatic VGA
Selection[default==1]:
```

Selecting item 1 generates the following plan9.ini to be used by the remainder of the bootstrap process:

menuitem=vga

monitor=multisync135

vgasize=1024x768x8

ether0=type=i82557

audio0=type=sb16 port=0x220 irq=5 dma=1

and selecting item 2:

menuitem=novga

ether0=type=i82557

audio0=type=sb16 port=0x220 irq=5 dma=1

SEE ALSO

9boot(8), booting(8), boot(8)

BUGS

Being able to set the console device to other than a display is marginally useful on file servers; MS–DOS and the programs which run under it are so tightly bound to the display that it is necessary to have a display if any setup or reconfiguration programs need to be run. Also, the delay before any messages appear at boot time is disconcerting, as any error messages from the BIOS are lost.

This idea is at best an interesting experiment that needs another iteration.

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